

having to go to a telephone to receive the message, satisfies the demand for complete and immediate message delivery. Knowing whether or not the message is urgent allows the pager user to decide who and when to return calls to.

EMCI is a consulting and market research firm providing services to the mobile communications industry. EMCI publishes publications and performs proprietary consulting regarding paging, cellular, SMR, and microcell technologies. EMCI was founded in 1987 and has staff in Washington, DC, London, and Tokyo.

2. The U.S. Paging Industry Trends and the Market for Voice Pagers

In recent years, digital display pagers (pagers that display a numeric message, usually a telephone number) have come to dominate the paging marketplace. The corresponding decline in voice pager use is not related to demand factors, however. This chapter examines aggregate trends relating to the types of pagers in use in the U.S. These trends indicate a potentially large market for voice pagers.

2.1 Trends by Pager Type

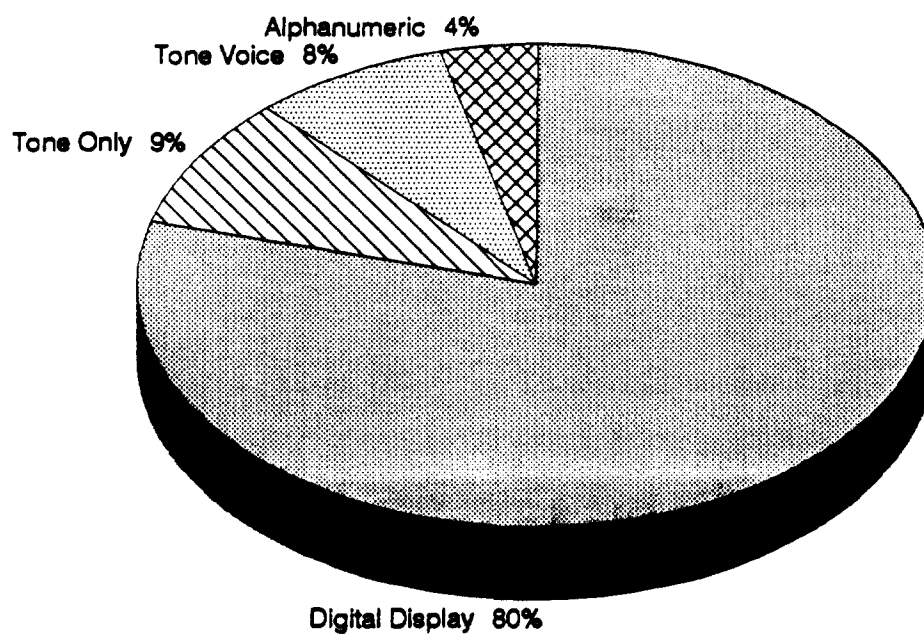
Digital display pagers dominate the U.S. paging market, accounting for approximately 80 percent of all pagers in service by year-end 1991 (see Figure 2.1). Other major pager types are:

- Tone only pagers (beepers): 9 percent;
- Tone voice: 8 percent; and
- Alphanumeric: 4 percent.

The dominance of digital display pagers has been increasing over the past five years (see Figure 2.2). In 1987, digital display pagers accounted for less than half of the subscriber base. Tone only pagers have fallen from 26 percent of the base, and tone voice pagers have fallen from 24 percent of the base. Alphanumeric pagers have increased their share of the base from insignificant levels in 1987 to approximately 4 percent today.

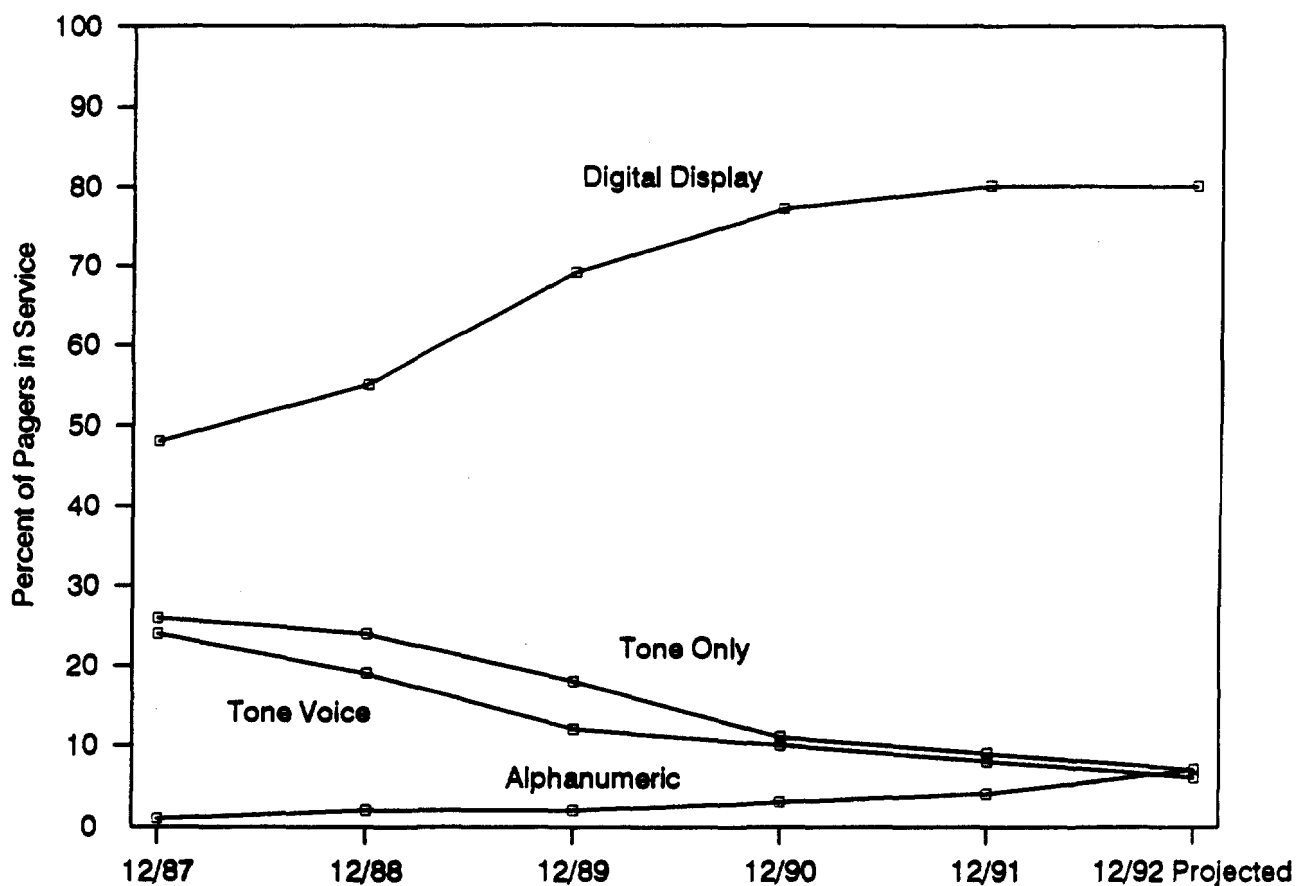
Shifting patterns in pager use are driven by both supply and demand factors. Tone only pagers no longer meet the needs of today's typical paging user, and demand for this type of pager has been falling for a number of years. Digital display pagers provide paging subscribers with a digital message in addition to an alert, and demand has been explosive in recent years.

**Figure 2.1. U.S. Pagers in Service by Type, 1991
(Percent of Pagers in Service)**



Source: EMCI, Inc., based on the EMCI paging survey, January 1992.

Figure 2.2. U.S. Pagers in Service by Type, 1987-1992
(Percent of Pagers in Service)



Source: EMCI, Inc., based on EMCI paging surveys, December 1988, June 1989, December 1989, December 1990, and January 1992.

Based on the decline in the share of tone voice pagers, it may erroneously appear that, like tone only pagers, demand for tone and voice pagers is also falling. However, an examination of pager trends by firm size indicates other forces are the primary drivers in the decline of voice pagers.

2.2 Voice Pager Market Share by Firm Size

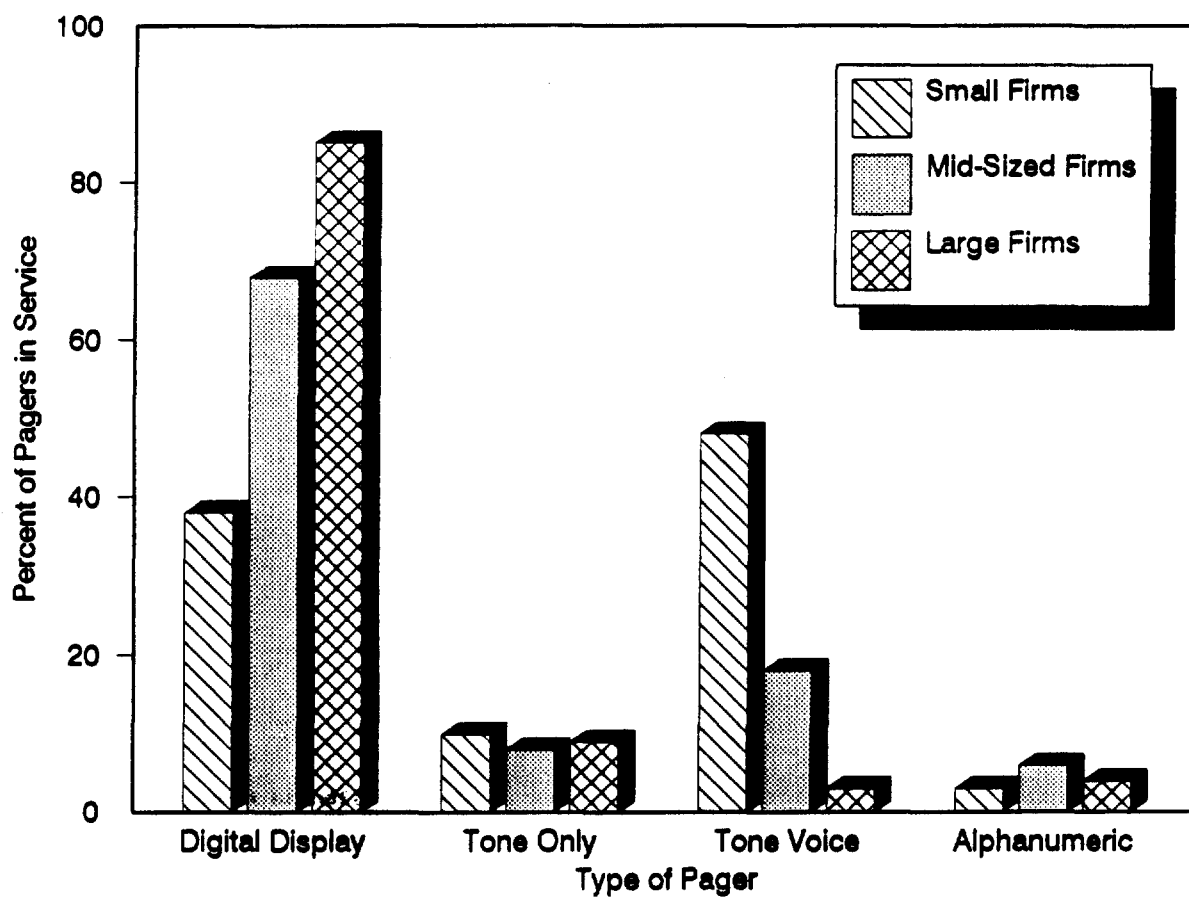
EMCI has found a vast difference in the type of pagers in service across different firm sizes (see Figure 2.3). The largest firms (those with over 10,000 pagers in service) service digital display pagers almost exclusively. Among small firms, voice pagers are the most popular pager type, representing approximately half of their base. EMCI has examined the reasons for these differences.

Large firms are heavily oriented toward the largest metropolitan markets, while small firms are more prevalent in small metropolitan and rural markets. A key factor facing firms in the large markets is frequency congestion, a situation which has been much less of a problem in smaller markets. Traditional voice pagers are much less spectrally efficient than digital display pagers. The channel capacity required by one voice pager can serve a minimum of 40 display pagers. In order to be able to serve the continuously growing subscriber base, paging companies in large, spectrum-scarce markets have gradually phased-out voice pager services.

The impact of supply considerations in voice pager services is evident when examining the decline in voice pager services over time by size of firm (see Figure 2.4). Large firms, which are most likely to operate in spectrum-scare environments, had virtually eliminated voice pager services by 1990. Small firms served the vast majority of their customers on voice pagers in 1987. These firms have followed the lead of the paging industry in promoting digital display services, but because they generally do not face capacity constraints, their share of tone voice pagers has remained at 50 percent and above through 1991.

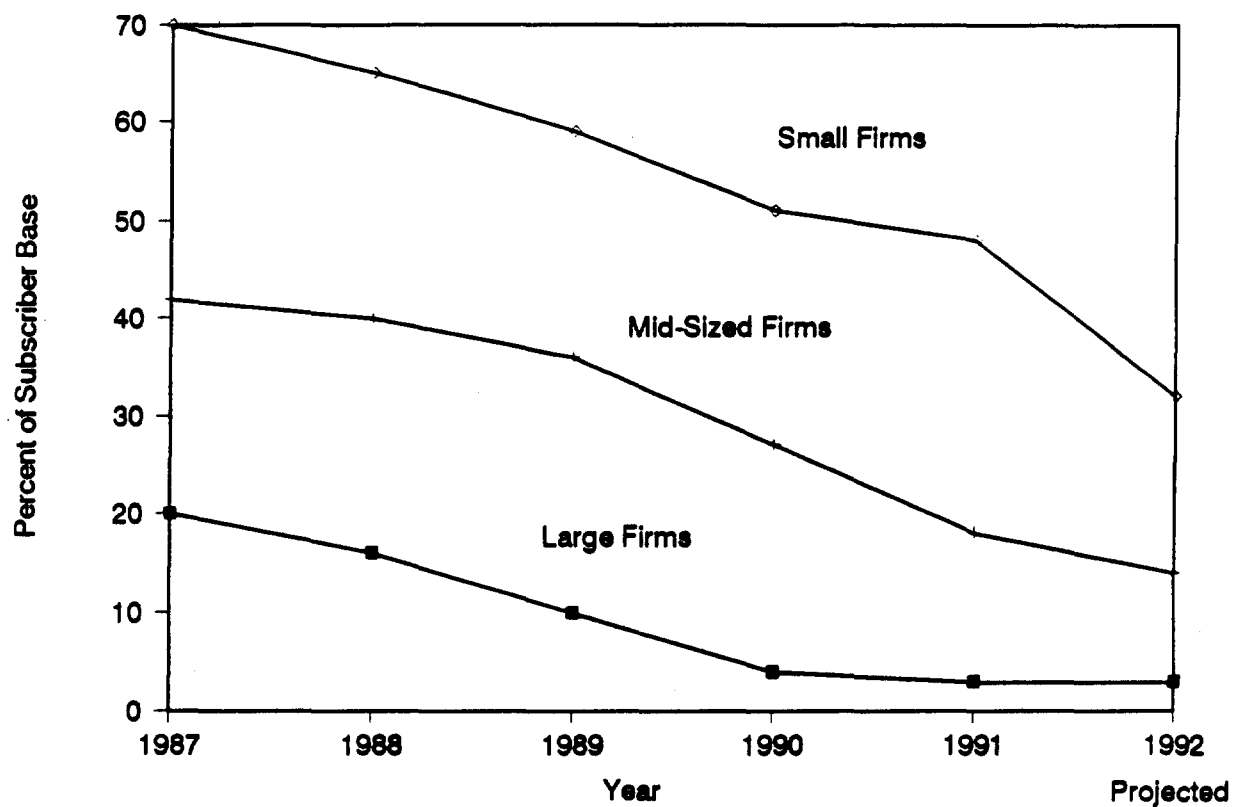
The decline in voice pager use for large firms operating in large markets is thus directly related to the greater efficiency of digital display products. The decline in voice pagers among small firms in smaller markets is due to a wider range of factors including higher infrastructure costs for voice pagers, and the lack of new voice pager products. A number of carriers have indicated to EMCI that voice pager products continue to be popular where offered.

Figure 2.3 U.S. Pagers in Service by Type, By Size of Firm, 1991



Source: EMCI, Inc., based on the paging survey, January 1992.

**Figure 2.4. Tone Voice Pagers Share of Subscriber Base,
by Size of Firm, 1987-1992**



**Source: EMCI, Inc., based on EMCI paging surveys, December 1988, June 1989,
December 1989, December 1990, and January 1992.**

2.3 Message Pager Demand and the Market for Voice Pagers

Shifts in customer preferences for different pager services are related to a critical underlying trend:

Subscribers want pagers that provide greater message content and are easy to use.

Other factors, such as pager size, weight, shape, and battery life, are also important considerations. These factors are most important, however, in choosing among pager devices once the type of pager and service has been selected. Message content and ease of use are the major factors driving type of service.

Since 1987, message pagers have grown from just over 70 percent of the market to approximately 95 percent of the market (see Figure 2.5). Paging beepers, which contain no message content, were once the standard industry device, and now represent an insignificant portion of the industry due to the consumer's need to receive a message with a page.

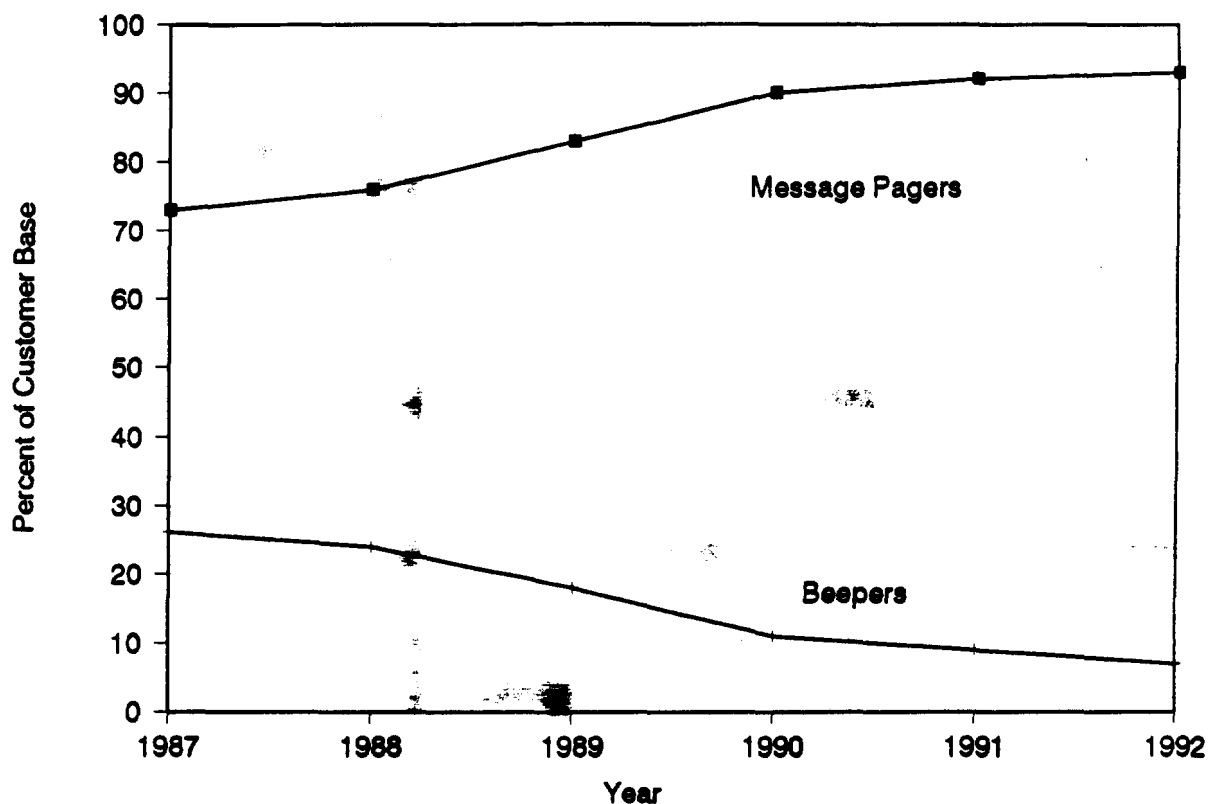
As has been previously discussed, there are significant differences among acceptance of message pagers:

- Digital display pagers present a nominal message (a telephone number), and are easy to use from any touch-tone telephone. These pagers have been highly successful and now dominate the market.
- Alphanumeric pagers offer much more message content, but U.S. sales have been constrained because the service is perceived by many as being difficult to use. Recent improvements in terminal systems and software in addition to the growth of operator services are resulting in growth of alphanumeric pagers. However, growth still lags early expectations based on the projected demand for message paging.
- Voice pagers have been in decline for a number of years primarily due to supply considerations. Consumers have generally been pleased with the flexible message content and ease of use. Some problems with voice quality, limited coverage of existing systems, and limited memory (or lack of memory) for storage have also limited this service in the past.

The new technology proposed by PageNet fits the proven needs of the marketplace, and has the potential to reverse the decline of voice services:

- **Message content.** Because it permits voice messages, this new technology gives great flexibility for messages.

**Figure 2.5. Message Pagers and Beepers
(Percent of Subscriber Base)**



Note: Message pagers include digital display, tone voice, and alphanumeric.

Beepers are tone only pagers.

Source: EMCI, Inc., based on EMCI paging surveys, December 1988, June 1989, December 1989, December 1990, and January 1992.

- **Ease of use for caller.** The proposed product has a clear advantage in ease of use in that it requires no operator intervention, use of a special terminal or software for message entry, or even use of special keys on a touch tone telephone. Sending a message is as easy as speaking into a telephone.
- **Ease of use for user.** One of the largest drawbacks given by users and non-users is that they do not know who is calling or why, and they have to find a payphone to receive their message. The proposed product provides instantaneous communication of the entire message, including emotional content. The user no longer has to wait to receive the message, or guess about the content or urgency of the message.
- **Service quality.** It is anticipated that this new technology will solve voice quality problems often found in old voice pagers. The ability to store multiple message to play back at the users convenience substantially enhance the quality of this service.
- **Spectrum efficiency.** The proposed service increases spectrum efficiency 25 times, enabling carriers to serve 25 times as many people than traditional voice pagers. This increase in efficiency will permit carriers to again offer voice paging services profitably in major metropolitan markets.

Thus, based on EMCI's analysis of trends in the paging marketplace, the proposed voice pager service appears to meet the needs of today's market by providing flexible message content in an easy to use pager. EMCI tested this hypothesis in a number of focus groups of paging users and non-users. Our findings are presented in Chapter 3.

3. Consumer Acceptance of Digital Storage Voice Pagers

To determine market acceptance of PageNet's digital storage voice pager concept, EMCI conducted four focus groups in the Washington/Baltimore metropolitan market. Two focus groups were conducted of pager users. These two groups were segmented by voice mail users and non-voice mail users. Two focus groups were conducted of potential users.

Focus groups are a useful market research tool early in the product development cycle. Because focus groups are loosely structured (as opposed to a written or telephone surveys), the researcher can assess consumer behavior and attitudes without restricting possible responses. Only after general consumer behavior patterns are understood, and the product definition is finalized, are more statistically projectable techniques applied.

The results of the focus groups discussed below are not statistically projectable, but are intended as a general indication of consumer interest and behavior.

These groups indicated a strong preference for the new voice pager service over existing pager services, even at higher prices.

3.1 Potential Users

3.1.1 Methodology

An important goal of the proposed service is to attract new subscribers to the paging industry. To determine potential customer acceptance of the new voice service among potential pager users, EMCI conducted two focus groups in the Washington/Baltimore metropolitan area among non-paging users with awareness of and interest in mobile communications services.

To recruit persons for the focus group, EMCI used the following screen (the screener questionnaire is shown in Appendix A):

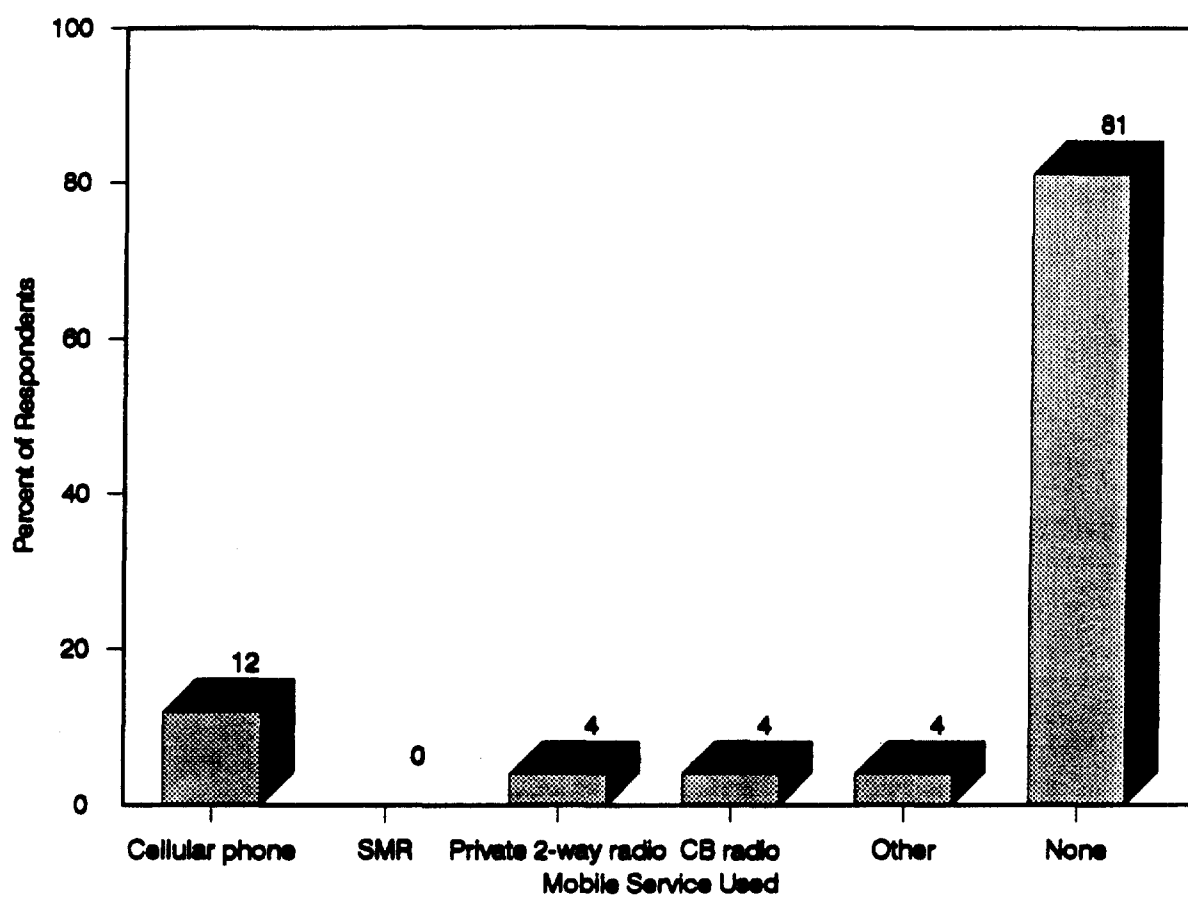
- Recent focus group experience. Persons were rejected if they had participated in a focus group in the past six months.
- Cellular or paging industry employee. These persons were rejected to eliminate any potential bias toward adopting mobile communications technologies.
- Current use of pager. Any person that currently used a pager was rejected.
- General awareness of mobile communications devices such as pagers and cellular telephones. Those that were not aware of these technologies were rejected.
- Interest in low cost mobile communications device. Those with no interest in these devices were rejected.
- Income. Only persons with personal salaries greater than \$18,000 were accepted.
- Age. Only persons between the age of 18 and 50 were accepted.
- Occupation. No quotas were set, but the groups were tracked to insure a range of occupations.
- Sex. Groups approximated an even distribution of males and females.

3.1.2 Group Profile

At the start of the focus groups, each member was asked to fill out a short profile questionnaire (shown in Appendix A). The groups had the following characteristics (see Figures 3.1 through 3.5):

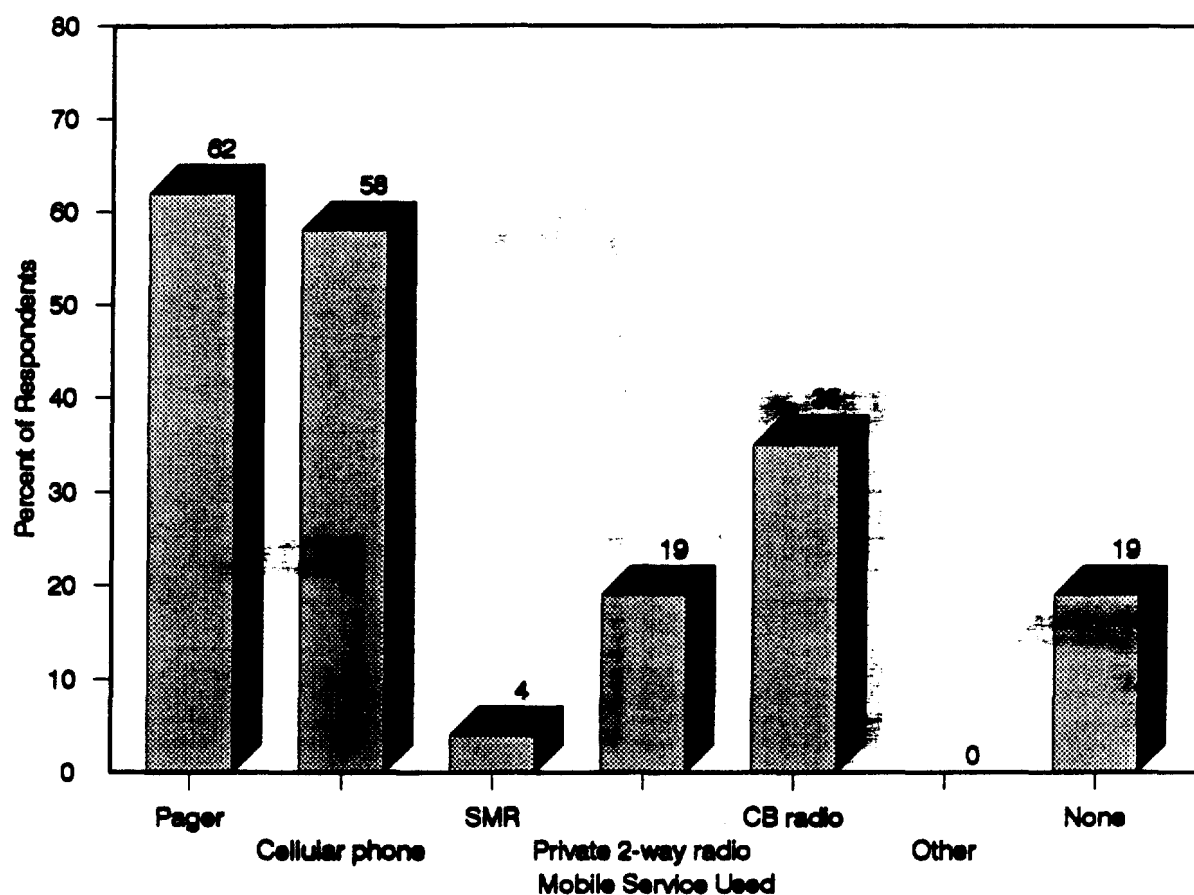
- 81 percent of the groups did not currently use any communications device. 12 percent used cellular.
- Over half had used a pager and/or cellular telephone in the past.
- 58 percent of respondents are away from a telephone between two to six hours per day. 27 percent are away less than two hours per day and 15 percent are away more than six hours per day.
- 81 percent were between the ages of 25 and 40.
- 50 percent of the respondents had a household income of \$25,000 to \$50,000, while 23 percent had incomes in excess of \$75,000.

**Figure 3.1 Current Mobile Communications Device Users
Percent of Respondents, Potential Users**



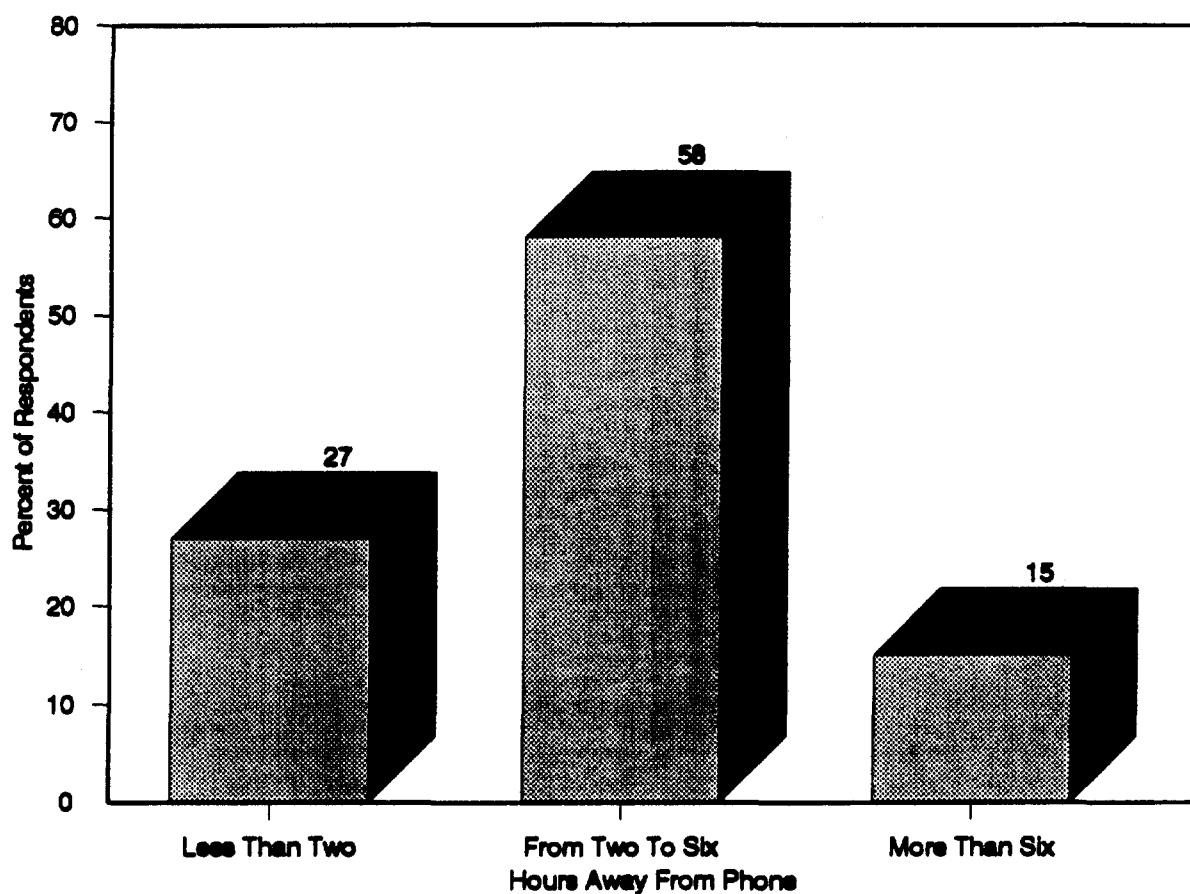
Source: EMCI, Inc.

**Figure 3.2 Past Mobile Communications Device Users
Percent of Respondents, Potential Users**



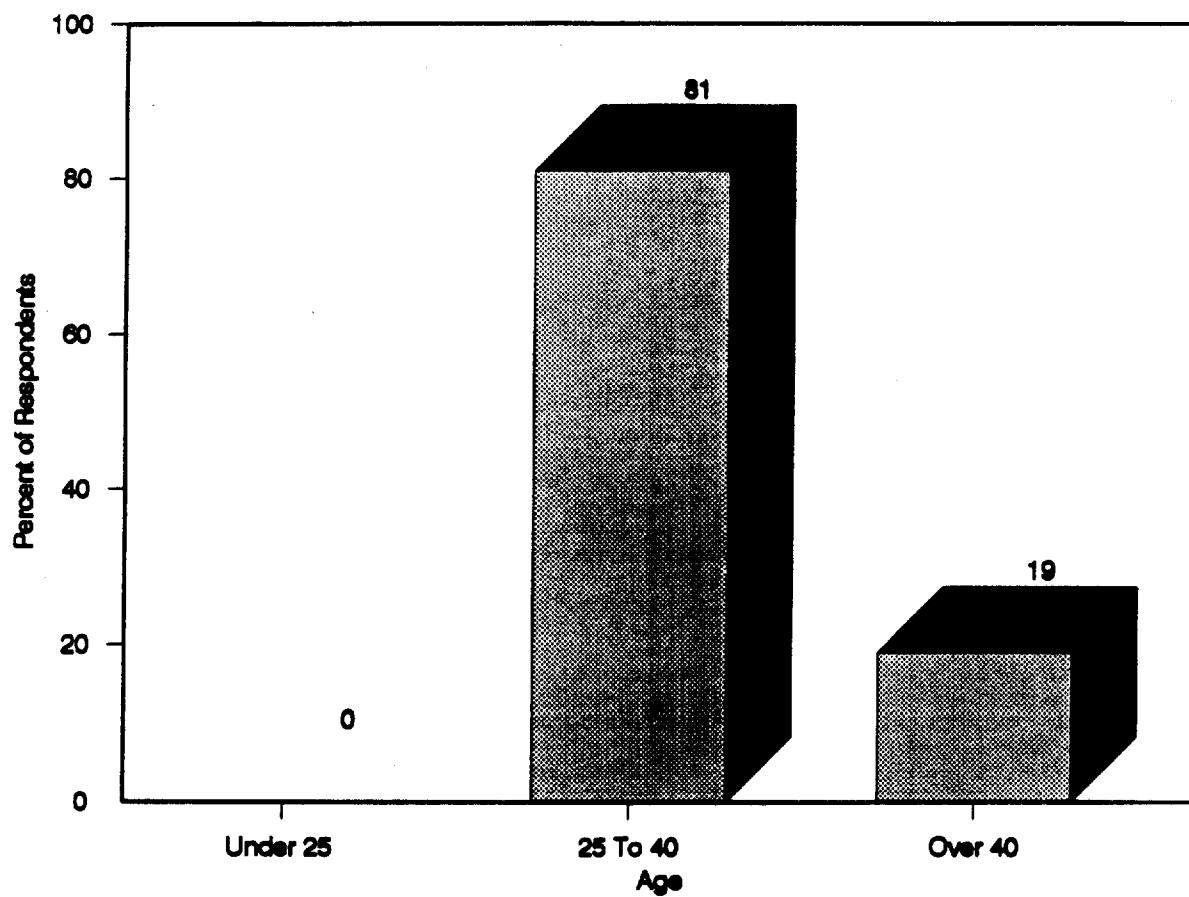
Source: EMCI, Inc.

**Figure 3.3 Hours Away From Phone
Percent of Respondents, Potential Users**



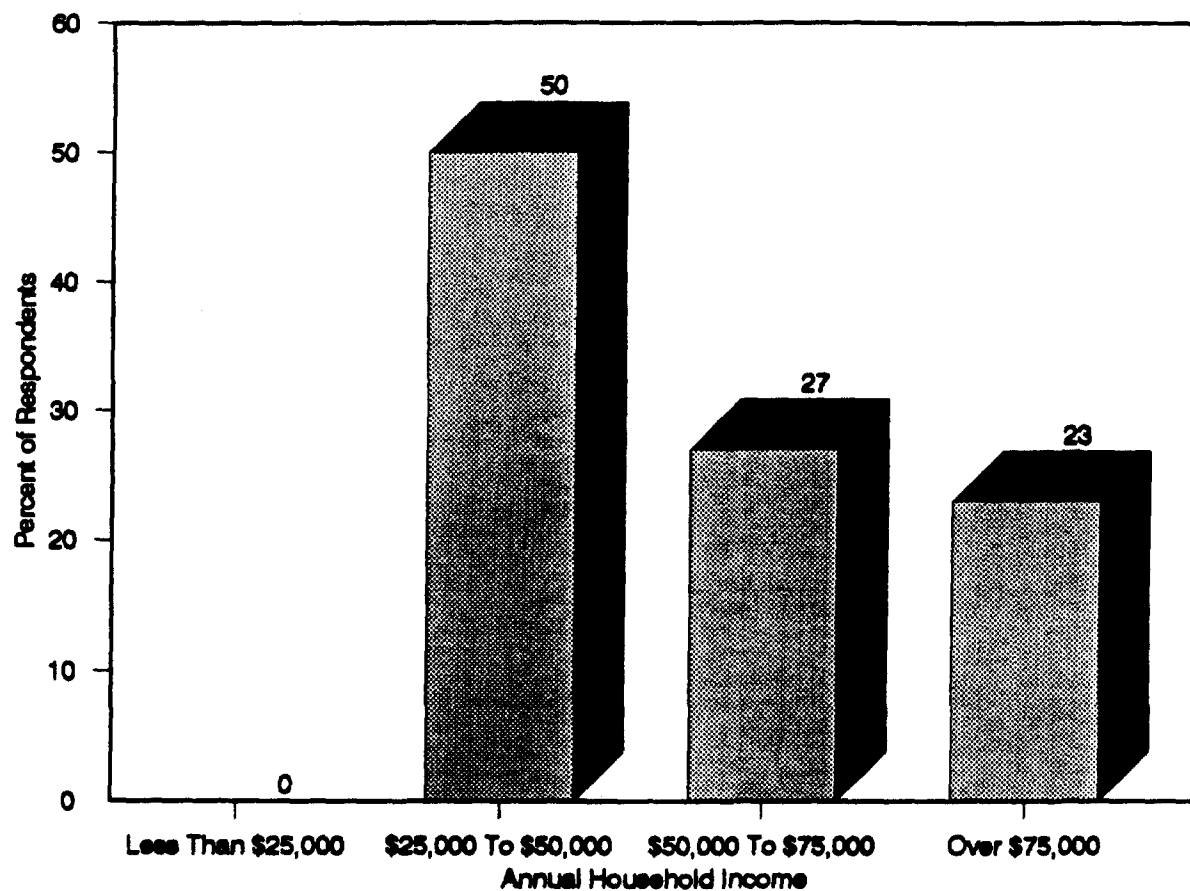
Source: EMCI, Inc.

Figure 3.4 Age Distribution
Percent of Respondents, Potential Users



Source: EMCI, Inc.

**Figure 3.5 Income Distribution
Percent of Respondents, Potential Users**



Source: EMCI, Inc.

3.1.3 Communications Needs

The groups had a high degree of familiarity of pagers and cellular telephones, with a good understanding of their use and benefits. The group was less knowledgeable, however, concerning the cost of service. Many felt that pagers and cellular telephones could be a valuable business tool. Several expressed interest in having a pager for personal use, but mentioned that they would be more sensitive to price for personal use.

Several respondents mentioned the value of a pager as a call screening device for cellular telephones. However, several comments were made concerning the need for information to screen pages - "I would like some form of caller identification rather than just the number", "I don't like the idea of having to get back to someone, not knowing who it is", "I don't like getting ambiguous numbers..would rather call the office and get voice mail."

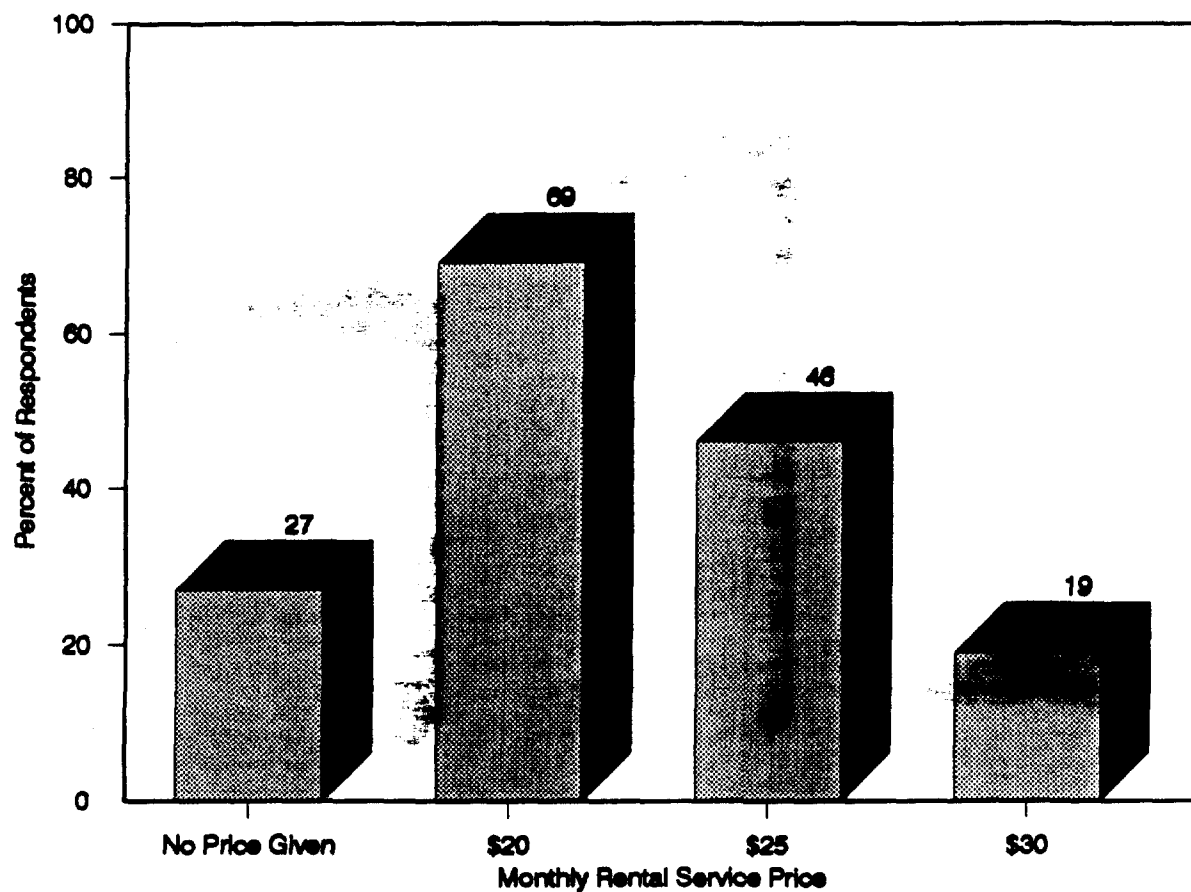
Many users and non-users expressed that the ability to receive a voice message instantaneously and that conveys the complete message would save them time and help them do their jobs better or manage their family life better. Users also expressed concern for their own public safety, as well as for the safety of those calling them. One women said that, in many instances, she will not stop late at night at a payphone to call the caller back, but will instead wait until they she arrives home. Focus group participants also said that there is a need for a pager that would allow them to respond to family emergencies better by hearing the exact message when the caller calls, and the urgency of the caller.

3.1.4 Interest In the Digital Storage Voice Pager

The groups were given a product description for the new digital storage voice pager concept and were also shown a Motorola Keynote pager which was used as the prototype pager. Before any price parameters were discussed, the groups were asked to rate their interest in subscribing to this service. Twenty-seven percent indicated that they would definitely or probably subscribe to this service based on the description (see Figure 3.6).

Subsequently, the groups were asked to rate their probability of subscribing at price levels of \$25 per month, \$30 per month, and \$20 per month. Interest (definitely and probably would subscribe) increased to 69 percent at \$20 per month and 46 percent at \$25 per month. Interest levels increased after indicating price levels of \$20 and \$25 per month because several participants believed the cost would be higher and felt that this was a reasonable price for the product.

Figure 3.6 Interest in Subscribing by Price Level
Percent of Respondents, Potential Users



Source: EMCI, Inc.

Factors which were key in generating interest were:

- the ability to use the device as a screen before calls are returned on a cellular telephone or landline network and associated cost savings
- the greater message capacity relative to digital display pagers
- the time savings due to the ability to hear a message in a car or at a job site without searching to find a telephone to get the message.

Based on the focus groups, a profile emerged of the potential user for this new voice service (see Table 3.1):

- cellular users, who are likely to use the pager as a call screening device;
- those away from a telephone more than six hours per day; and
- persons with household income between \$25,000 and \$50,000.

Gender does not appear to be a factor, with males and females equally likely to subscribe based on the other characteristics shown above.

Perhaps the most important outcome among potential paging users was the preference of this new voice pager over existing digital display pagers. The groups were virtually unanimous in stating that if they were in the market for a pager, they would select this voice service over existing digital display services, even though the voice service would cost more.

Of those not interested in the product, reasons included no need, need for full two-way voice communications, and a distaste for recorded messages. Several participants were concerned about the memory capacity of two minutes and there was significant concern that messages would be lost. This concern was alleviated somewhat when memory management was discussed further (erasing messages from memory after listening to them), and the option of using voice mail as a backup system for messages at additional cost.

Table 3.1 Interest in Subscribing at \$25 per Month by Respondent Category

	Interest (Percent of Group)	Number of Observations In Group
Current Cellular User	67	3
Past User		
Cellular	47	15
Paging	50	16
Hours Away From Phone		
Less Than Two	43	7
From Two To Six	40	15
More Than Six	75	4
Age		
Under 25	na	0
25 To 40	57	21
Over 40	0	5
Income		
Less Than \$25,000	na	0
\$25,000 To \$50,000	69	13
\$50,000 To \$75,000	29	7
Over \$75,000	21	6
Sex		
Male	45	11
Female	47	15

Source: EMC1, Inc.

3.2 Pager Users

3.2.1 Methodology

Two focus groups were conducted with existing paging users to determine if the new voice pager service would better meet the needs for a segment of the existing subscriber base. The two focus groups were divided into users of voice mail services and non-voice mail users. Voice mail users were grouped separately because these existing users of a type of voice service were believed to be a high potential segment within the paging industry.

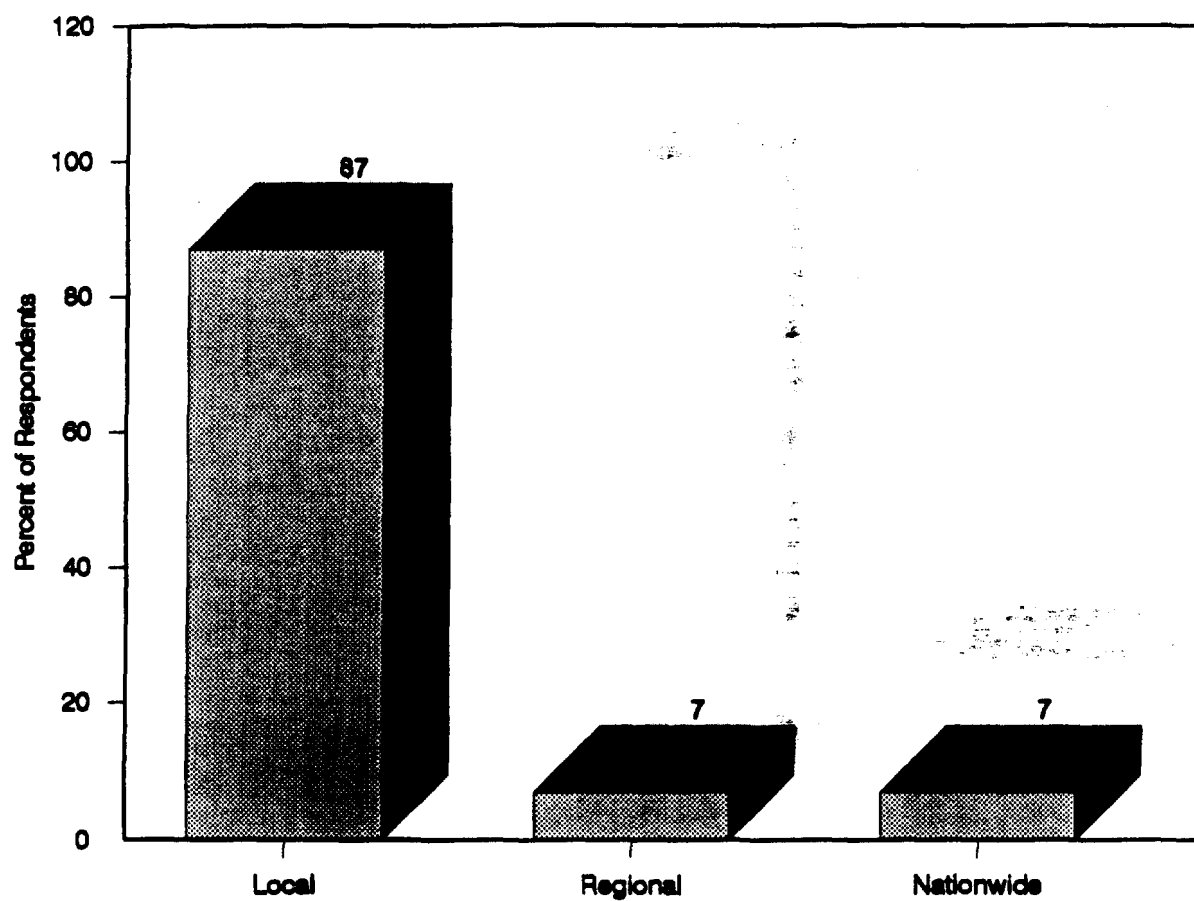
Potential participants were called at random from a PageNet customer list. Participants were selected only if they were a current user of paging services.

3.2.2 Group Profile

Participants in the paging user groups had the following characteristics (see Figures 3.7 through 3.13):

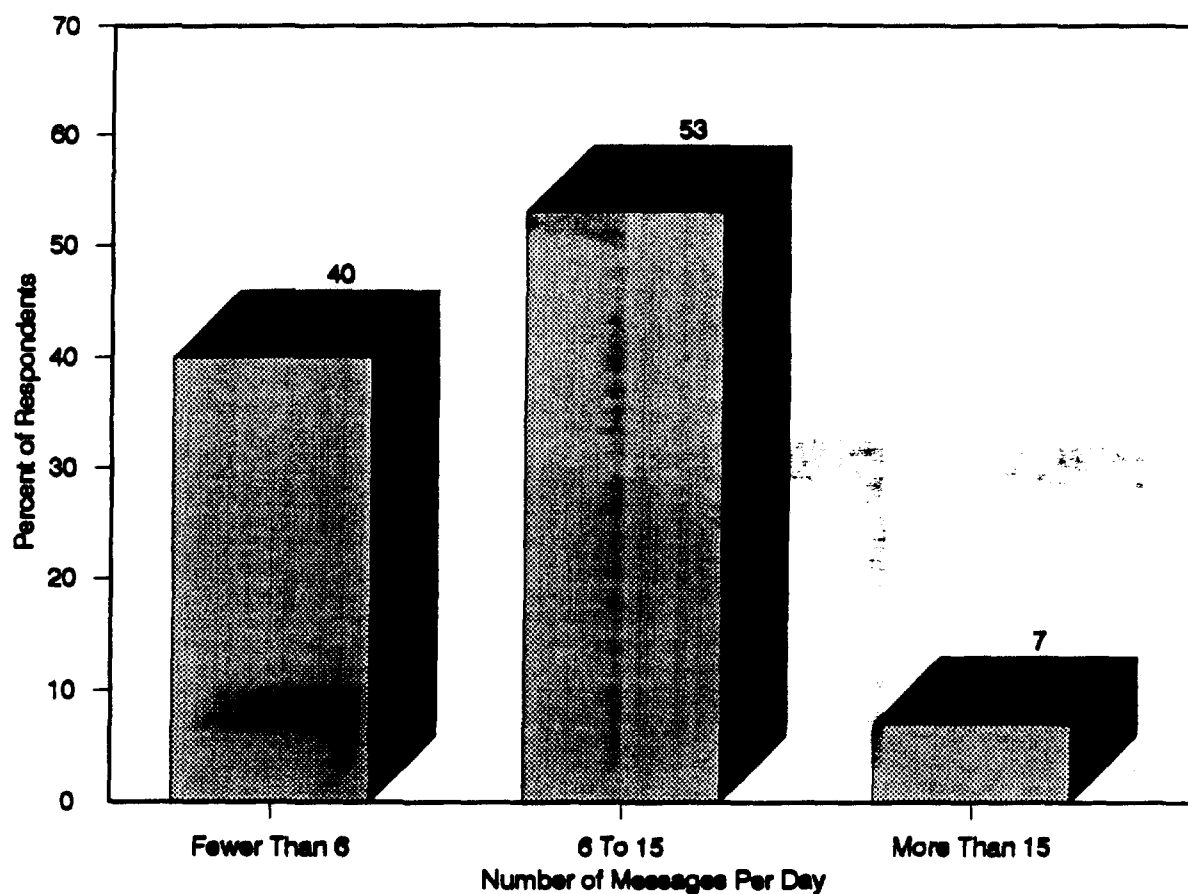
- 87 percent used only the local service option;
- 60 percent of the participants received more than six messages per day
- business and personal use were fairly evenly distributed, with one-third using the pager for at least 60 percent business use, and 20 percent using the pager almost exclusively for personal.
- 19 percent of the users also used cellular telephones
- most participants had paging service for two years or less
- the age of the group was split evenly between those under 25 and those over 25 years old
- the largest income group was between \$25,000 and \$50,000 household income (44 percent). 25 percent of the participants had household income in excess of \$75,000.

**Figure 3.7 Paging Coverage Area Subscribed To
Percent of Respondents, Paging Users**



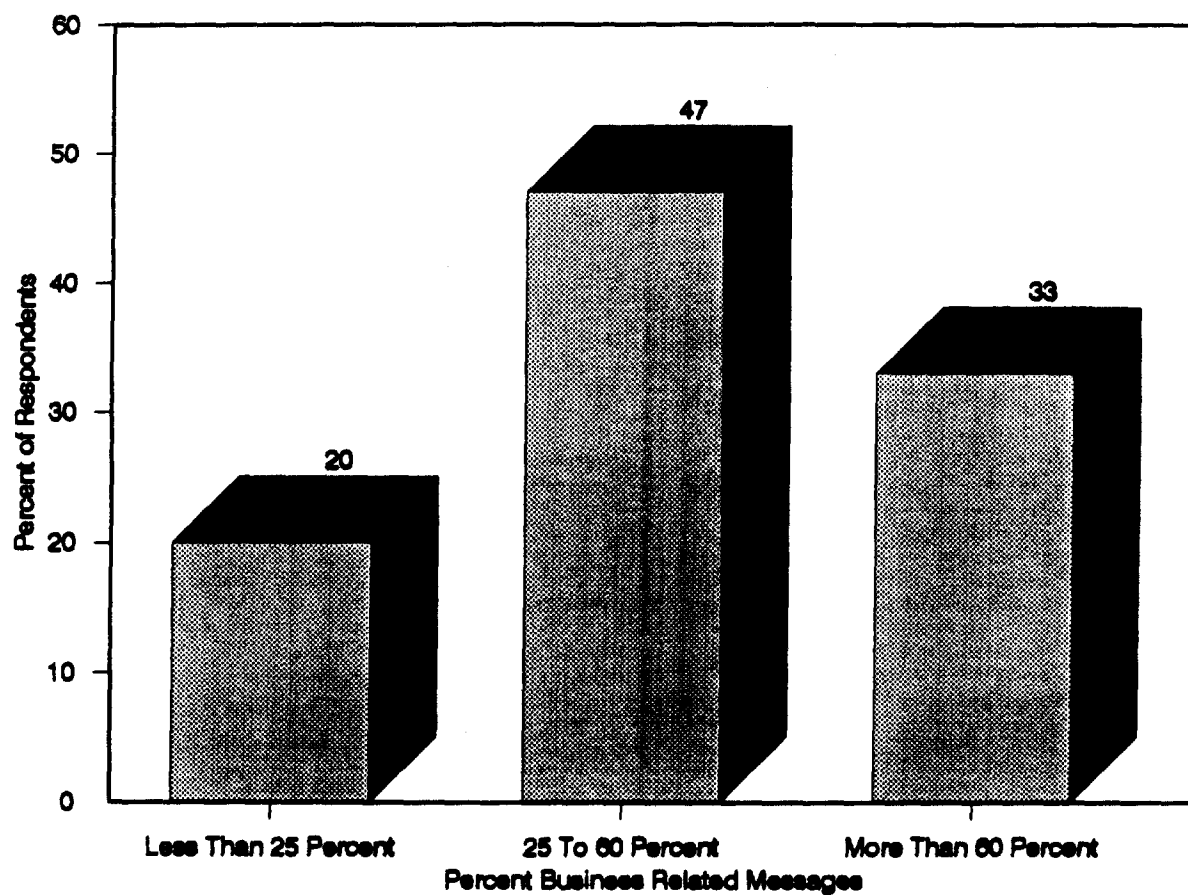
Source: EMCI, Inc.

**Figure 3.8 Average Messages Received Per Day
Percent of Respondents, Paging Users**



Source: EMCI, Inc.

Figure 3.9 Percent Business Related Messages
Percent of Respondents, Paging Users



Source: EMCI, Inc.